DIVERSITY IN LIVING ORGANISM

QUESTION ?

- **ARE YOU ALL OF THE SAME HEIGHT?**
- **DOES YOUR NOSE LOOK EXACTLY LIKE YOUR FRIEND'S NOSE?**
- **IS YOUR HAND SPAN THE SAME AS YOUR FRIEND'S?**

INTRO

- ALL LIVING THINGS ARE IDENTIFIED AND CATEGORISED ON THE BASIS OF THEIR BODY FORMS AND FUNCTIONS.
- SOME CHARACTERSTICS ARE LIKELY TO MAKE MORE WIDE RANGING CHANGES IN BODY DESIGN THAN OTHERS
- SYSTEMATICS(SYSTEM-ORDER OR SEQUENCE)

SYSTEMATICS

1. IDENTIFICATION
2. CLASSIFICATION
3. NOMENCLATURE
4. TAXONOMY

CLASSIFICATION

- SCIENTIFIC ARRANGEMENT OF AN ORGANISM IN A SPECIFIC HIERARCHIAL SERIES OF GROUP ON THE BASIS OF SIMILARITIES AND DIFFERENCES.
- **CHARLES DARWIN** FIRST DESCRIBED THIS IDEA OF EVOLUTION IN 1859 IN HIS BOOK, **THE ORIGIN OF SPECIES.**

BASIS OF CLASSIFICATION

- IT IS BASED ON CHARACTERSTICS WHICH OCCUR IN CERTAIN GROUPS OF ORGANISM THAT MAKE THEM DIFFERENT FROM OTHER GROUPS.
- **ARISTOTLE ,** GREEK SCIENTIST, CLASSIFIED ANIMALS ACCORDING TO THEIR HABITATS i.e WHETHER THEY LIVED ON LAND, IN WATER OR IN THE AIR.

OBJECTIVES

1. TO RECOGNISE AND PRECIESELY DISTRIBUTE THE BASIC UNITS OF CLASSIFICATION (SPECIES) ON THE BASIS OF **PRE-DECIDED CHARACTERSTICS OF ORGANISM.**
2. TO DEVISE AN APPROPRIATE CRITERIA OF ASSIGNING THE BASIC UNITS(SPECIES) INTO AN ASCENDING SERIES OF GROUPS ON THE BASIS OF THEIR **SIMILARITIES AND RELATIONSHIP.**
3. TO SHOW THE EVOLUTIONARY CHANGES OF THE ORGANISM.

THE HIERARCHY OF CLASSIFIACTION

- INTRODUCED BY **LINNAEUS**
- **ERNST HAECKEL (1894),**
- **ROBERT WHITTAKER(1969)**
- **CARL WOESE(1977)**

→ **KINGDOM**

(BROAD CATOGARY)

FIVE KINGDOMS

WHITTAKER CLASSIFIACTION-

1. **MONERA**
2. **PROTISTA**
3. **FUNGI**
4. **PLANTAE**
5. **ANIMALIA**

- **ON THE BASIS OF CELL STRUCTURE, MODE AND SOURCE OF NUTRITION AND BODY ORGANISATION.**

FURTHER CLASSIFICATION

- KINGDOM — HIGHEST
- PHYLUM(ANIMALS)/DIVISION(PLANTS)
- CLASS
- ORDER
- FAMILY
- GENUS
- SPECIES — LOWER

- BASIC UNITS OF CLASSIFICATION – **SPECIES**
- SPECIES INCLUDES ALL ORGANISM THAT ARE SIMILAR ENOUGH TO BREED AND PERPETUATE.

NOMENCLATURE

- **CAROLUS LINNAEUS**
- SCIENTIFIC OR TECHNICAL NAMING OF PLANTS & ANIMALS
- BINOMIAL NOMENCLATURE

1. I WORD- GENERIC NAME
2. II WORD- SPECIFIC NAME

SOME IMPORTANT COMMON NAMES & THEIR SCIENTIFIC NAMES

COMMON NAME	SCIENTIFIC NAME
MAN	HOMO SAPIENS
LEOPARD	PANTHERA PARDUS
TIGER	PANTHERA TIGRIS
LION	PANTHERA LEO
PEA	PISUM SATIVUM
CAT	FELIS DOMESTICA
FROG	RANA TIGRINA
RICE	ORYZA SATIVA
MUSTARD	BRASSICA CAMPESTRIS
GRAM	CICER ARIETINUM
WHEAT	TRITICUM AESTIVUM
COW	BOS INDICA
MANGO	MANGIFERA INDICA
DOG	CANIS FAMI

1. MONERA

- MONERA DO NOT HAVE A DEFINED NUCLEUS.
- USUALLY ONE OR SINGLE CELLED ORGANISM.
- SOME OF THEM HAVE CELL WALLS WHILE SOME DO NOT.
- MODE OF NUTRITION AUTOTROPHIC OR HETROTROPHIC
- Eg. BACTERIA, BLUE GREEN ALGAE OR CYANNOBACTERIA, AND MYCOPLASMA
- ACTINOMYCETES, RICKETTSIA AND ARCHAEBACTERIA

BACTERIA

- DISCOVERED BY **A V LEEUWENHOEK IN 1683**
- NAMED BY **EHRENBERG** IN 1829
- UNICELLULAR FORM
- FOUND IN ALL PLACE WHERE ORGANIC MATTER IS PRESENT i.e IN WATER SOIL, OVER AND INSIDE THE ORGANISM
- USUALLY VARY IN SHAPE AND SIZE

GENRAL CHARACTERSTICS

- MOST BACTERIA ARE AUTUTROPHIC AND SOME OF THEM HETROTRPHIC
- HAVE THICK CELL WALL(MADE UP OF CHITIN) AND INNER CELL MEMBRANE (PROTEINS & PHOSPHOLIPIDS)
- REPRODUCE ASEXUALLY BY BINARY FISSION
- PERFORM RESPIRATORY ACTIVITIES BY MESOSOMES
- BACTERIA PRODUCE METHANE(FROM FORMIC ACID) AND CO2 AND KNOWN AS METHANOGIC BACTERIA. Eg. METHANOCOCCUS
- BACTERIA IS RESPONSIBLE FOR CAUSING VARIOUS DISEASE

2. PROTISTA

- PROTISTA INCLUDES MOSTLY AQUATIC UNICELLULAR EUKARYOTIC ORGANISM.
- SOME OF THESE ORGANISM USE APPENDAGES, SUCH AS HAIR-LIKE CILIA OR WHIP-LIKE FLAGELLA FOR MOVING AROUND.
- MODE OF NUTRITION CAN BE AUTOTROPHIC OR HETROTROPHIC
- Eg. ALGAE,DIATOMS AND PROTOZOA

GENERAL CHARACTERSTICS

- CELL STRUCTURE- SURROUNDED BY PLASMALEMMA AS CELL MEMBRANE
- CELL WALL- COMPOSE OF CELLULOS, PROTEINS STRIPS AND SILICA.
- CELL ORGANELLES- LIKE MITOCHONDRIA, GOLGIBODY, ENDOPLASMIC RETICULUM, NUCLEUS, CHROMOSOME, etc ARE PRESENT IN THE FULLY DEVELOPED FORMS.
- RIBOSOME- 80 S PRESENT
- REPRODUCTION- BOTH SEXUAL & ASEXUAL
- LOCOMOTION- FOUND MOSTLY PSEUDOPODIAL
- Eg. AMOEBA, FLAGELLAR AND CILIARY.

- **PROTOZOAN PROTIST LIKE AMEOBA, PLASMODIUM AND TRYPANOSOMA CAUSE DIARRHOEA, MALERIA AND AFRICAN SLEEPING-SICKNESS, RESPECTIVELY.**

3. FUNGI

- MOST PRIMITIVE AND SHOW A GREAT DIVERSITY IN MORPHOLOGY
- HETROTROPHIC EUKARYOTIC ORGANISM
- POSSES A UNICELLULAR OR MULTICELLULAR STRUCTURALLY THEY HAVE DEFINITE CELL WALL AND TRUE NUCLEUS BUT LACK CHLROPHYL
- SOME OF FUNGI USE DECAYING ORGANIC MATERIAL AS FOOD CALLED **SAPROTROPHS.**
- SOME REQUIRES A LIVING PROTOPLASM OF A HOST ORGANISM FOR FOOD. THEY ARE CALLED **PARASITES.**

GENRAL CHARACTERSTICS

- STRUCTURE- ELONGATED, TUBULAR FILAMMENTS KNOWN AS HYPHAE i.e MYCELLIUM
- CELL WALL- MADE UP OF TOUGH COMPLEX SUGAR **CHITIN OR FUNGAL CELLULOSE**
- FOOD RESERVE- IN THE FORM OF GLYCOGEN AND OIL
- REPRODUCTION- SEXUAL, ASEXUAL & VEGETATIVE(BY FREGMENTATION,BUDDING, FISSION)
- SPORE FORMING- YEAST, MUSHROOMS,ASPERGILLUS, PENICILLIUM, RHIZOPUS & AGARICUS

4. PLANTAE

- FIRST LEVEL OF CLASSIFICATION AMONG PLANTS DEPENDS ON WHETHER THE PLANT BODY HAS WELL DIFFERENTIATED, DISTINCT PARTS.
- THE NEXT LEVEL OF CLASSIFICATION IS BASED ON WHETHER THE DIFFERENTIATED PLANT BODY HAS SPECIAL TISSUES FOR THE TRANSPORT OF WATER AND OTHER SUBSTANCES.
- FURTHER CLASSIFICATIO- ABILITY TO BEAR SEEDS & WHETHER THE SEEDS ARE ENCLOSED WITHIN FRUITS.
- LIVEWORTS, MOSSES,FERNS AND SEEDS PLANT WITH OR WITHOUT FLOWERS
- MULTICELLULAR EUKARYOTICS
- HAVING CHLOROPHYL

TYPES OF PLANTAE

1. THALLOOHYTA
2. BRYOPHYTA
3. PTERIDOPHYTA
4. GYMNOSPERMA
5. ANGIOSPERMS

4.I. THALLOPHYTA

- PLANTS DO NOT HAVE WELL-DIFFERENTIATED BODY DESIGN FALL IN THE GROUP.
- PLANT IN THIS GROUP ARE COMMONLY CALLED ALGAE i.e **GREEN, BROWN & RED ALGAE**
- THESE PLANTS ARE PREDOMINANTLY AQUATIC
- Eg. SPIROGYRA, ULOTHRIX, CLADOPHORA, ULVA & CHARA

4.II. BRYOPHYTA

- AMPHIBIANS OF THE PLANT KINGDOM
- THE PLANT BODY IS COMMONLY DIFFERENTIATED TO FORM STEM AND LEAF LIKE STRUCTURES.
- NO SPECIALISED TISSUE FOR THE CONDUCTION OF WATER AND THE OTHER SUBSTANCES FROM ONE PART OF THE PLANT BODY TO ANOTHER.
- Eg. MOSS(FUNARIA), MARCHANTIA,RICCIA

4.III. PTERIDOPHYTA

- THE PLANT BODY IS DIFFERENTIATED INTO ROOTS, STEMS AND LEAVES
- HAVING SPECIALISED TISSUE FOR THE CONDUCTION OF WATER AND OTHER SUBSTANCE FROM ONE PART OF THE BODY TO ANOTHER.
- Eg. MARSILEA, FERNS AND HORSE-TAILS
- CRPYTOGAMS- PLANT THOSE WITH HIDDEN REPRODUCTIVE ORGANS

- PLANTS WITH WELL- DIFERENTIATED REPRODUCTIVE PARTS THAT ULTIMATELY MAKE SEEDS ARE CALLED PHANEROGERMS.
- SEEDS ARE THE RESULT OF THE SEXUAL REPRODUCTION PROCESS
- THEY CONSIST OF THE EMBRYO ALONG WITH STORED FOOD, WHICH ASSISTS FOR THE INITIAL GROWTH OF THE EMBRYO DURING GERMINATION

4.IV. GYMNOSPERMS

- GMYNO- NAKED AND SPERMA- SEEDS
- PLANT OF THIS GROUP BEAR NAKED SEEDS
- PERENNIAL, EVERGREEN AND WOODY
- Eg. PINES, CYCUS AND DEODAR

4.V. ANGIOSPERMS

- ANGIO- COVERED AND SPERMA- SEED
- FLOWERING PLANTS
- THE SEEDS DEVLOP INSIDE AN OVARY WHICH IS MODIFIED TO BECOME A FRUIT
- PLANT EMBRYOS IN SEEDS HAVE STRUCTURES CALLED COTYLEDONS(SEED LEAVES)

ANGIOSPERM

ON THE BASIS OF THE NUMBER OF COTYLEDON PRESENT

1. MONOCOTS

2. DICOTS

IMPORTANCES OF THE ANGIOSPERMS

- COMPRISE OUR MAJOR FOOD, FIBRE, SPICE AND BEVERAGE CROPS
- USED IN MAKING MEDICINES, PERFUMES, RUBBER SOAPS AND COSMETICS
- ALSO PROVIDES US WITH TIMBER AND MEDICINES
- **RED WOOD TREE- FATHER OF FOREST (SEQUOIA GIGANTEA)**

5. ANIMALIA

- ORGANISM ARE MULTICELLULAR, EUKARYOTIC AND HETROTROPHIC
- DO NOT HAVE CELL-WALLS
- MOST ANIMAL ARE MOBILE
- DO NOT EXHIBIT THE SAME PATTERN OF ORGANISATIONS OF CELLS

GENRAL CHARACTERSTICS

1. DO NOT HAVE CELL WALL
2. ANIMALS HAVE 4 DIFFERENT LEVELS OF ORGANISATION
   - PROTOPLASMIC GRADE(PROTOZOAN)
   - CELLULAR GRADE(SPONGES, MESOZONAS)
   - TISSUE GRADE(PLATYHELMINTHES)
   - ORGAN SYSTEM(INVERTEBRATES & VERTEBRATES)
3. BODY SYMMETRY
   - ASYMMETRICAL(AMOEBA)
   - RADIAL(PORIFERA)
   - BILATERAL(NEMATODA)

TYPES OF ANIMALIA

1. PORIFERA
2. COELENTERATA
3. PLATYHELMINTHIS
4. NEMATODA
5. ANNELIDA
6. ARTHOPODA
7. MOLLUSCA
8. ECHINODERMATA
9. PROTOCHONDRIA
10. VERTEBRATA

5.I. PORIFERA

- PORIFERA MEANS ORGANISMWITH HOLES
- NON-MOTILE ANIMALS ATTACHED TO SOME SOLID SUPPORT
- THERE ARE HOLES OR PORES ALL OVER THE BODY THAT LEADS TO A CANAL SYSTEM THATB HELPS IN CIRCULATING WATER THROUGHOUT THE BODY TO BRING IN FOOD AND OXYEGEN
- COVERED WITH A HARD OUTSIDE LAYER OR SKELETON
- THE BODY DESIGN INVOLVES VERY MINIMAL DIFFERENTITAION AND DIVISION INTO TISSUES
- COMMNLY CALLED SPONGES
- MAINLY FOUND IN MARINE HABITATS
- Eg. EUPLECTELLA, SYCON & SPONGILLA

5.II. COELENTEREATA(CNIDARIA)

- ANIMALS LIVING IN WATER AND SHOW MORE BODY DESIGN DIFFERENTITATION
- THERE IS A CAVITY IN THE BODY
- BODY IS MADE UP OF TWO LAYERS OF CELLS

1. ONE MAKES UP CELLS ON THE OUTSIDE OF THE BODY
2. MAKES THE INNER LINING OF THE BODY

- SOME OF THESE LIVE IN COLONIES(CORALS) AND OTHERS HAVE A SOLITARY LIKE SPAN(HYDRA)
- Eg. JELYFISH, SEA ANEMONE

5.III. PLATYHHELMINTHES

- COMPLEXLY DESIGNED BODY
- BILATERALLY SYMMETRICAL
- TRIPLOBLASTIC- THREE LAYERS OF CELL FROM WHICH DIFFERENTIATED TISSUES CAN BE MADE. THIS ALLOWS OUTSIDE AND INSIDE BODY LININGS AS WELL AS SOME ORGANS TO BE MADE
- THERE IS NO TRUE INTERNAL BODY CAVITY OR COELOM, IN WHICH WELL-DEVELOPED ORGANS CAN BE ACCONODATED
- FLATWORMS- BODY IS FLATTENED DORSOVENTRALLY(TOP TO BOTTOM)
- FREE LIVING(PLANARIANS) OR PARASITIC(LIVERFLUKES), TAPEWORM

5.IV. NEMATODA

- BILATERALLY SYMMETRICAL & TRIPLOBLASTIC
- BODY IS CYLINDRICAL RATHER THAN FLATTENED
- THERE ARE TISSUE BUT NO REAL ORGANS, ALTHOUGH A SORT OF BODY CAVITY OR A PSEUDO-COELOM IS PRESENT
- Eg. ASCAIRS, WUCHERERIA

5.V. ANNELIDA

- BILATERALLY SYMMETRICAL & TRIPLOBLASTIC
- HAVING A TRUE BODY CAVITY, THIS ALLOWS TRUE ORGANS TO BE PACKAGED IN THE BODY STRUCTURE
- FOUNDS IN A VARIETY OF HABITATS- FRESH WATER, MARINE WATER AS WELL AS LAND
- Eg. EARTHWORM, LEECHES AND NEREIS

5.VI. ARTHROPODA

- ARTHROPOD MEANS JOINTED LEGS
- LARGEST GROUP OF ANIMALS
- BILATERALLY SYMMETRICAL & SEGMENTED
- THERE IS AN OPEN CIRCULATORY SYSTEM, AND SO THE BLOOD DOES NOT FLOW IN WELL-DEFINED BLOOD VESSELS.
- COELOKIC CAVITY IS BLOOD FILLED
- Eg. PRAWNS, BUTTERFLIES, HOUSEFLIES, SPIDERS, SCORPIANS AND CRABS

5.VII. MOLLUSCA

- BILATERAL SYMMETRY
- THE COELMIC CAVITY IS REDUCED
- LITTLE SEHGMENTATION
- OPEN CIRCULATORY SYSTEM AND KIDNEY-LIKE ORGANS FOR EXCRETION
- THER IS A FOOT THAT IS USED FOR MOVING AROUND
- Eg. SNAILS, MUSSELS, CHITON, OCTOPUS, PILA AND UNIO

5.VIII. ECHINODERMATA

- ECHINOS- HEDGEHOG(SPINY MAMMAL) & DERMA MEANS SKIN
- SPINY SKINNED ORGANISM
- EXCLUSIVELY FREE-LIVING MARINE ANIMALS
- TRIPLOBLASTIC & HAVE A COELMIC CAVITY
- HAVE A PECULIAR WATER-DRIVEN TUBE SYSTEM THAT THEY USE FOR MOVING AROUND.
- HAVE HARD CALCIUM CARBONATE STRUCTURES THAT THEY USE AS A SKELETON
- Eg. SEA-STARS, SEA URCHINES, FEATHER STAR

5.IX. PROTOCHORDATA

- BILATERALLY SYMMETRICAL
- TRIPLOBLASTIC & HAVE A COELOM
- SHOW A NEW FEATURE OF BODY DESIGN, **NOTOCHORD** , AT LEAST AT SOME STAGES DURING THEIR LIVES.
- **NOTOCHORD IS A LONG ROD-LIKE SUPPORT STRUCTURE THAT RUNS ALONG THE BACK OF THE ANIMAL SEPERATING THE NERVOUS SYSTEM FROM THE GUT. IT PROVIDES A PLACE FOR MUSCLES TO ATTACH FOR EASE OF MOVEMENT.**
- PROTOCHORDATES MAY NOT HAVE A PROPER NOTOCHORD PRESENT AT ALL STAGES IN THEIR LIVES OR FOR THE ENTIRE LENGTH OF THE ANIMAL
- MARINE ANIMALS
- Eg. BALANOGLOSSUS, HERDMANIA & AMPHIOUXUS

5.X. VERTEBRATA

- HAVE **A TRUE VERTEBRAL COLUMN** AND INTERNAL SKELETON ALLOWING A COMPLETELY DIFFERENT DISTRIBUTION OF MUSCLES ATTACHEMENT POINTS TO BE USED FOR MOVEMENT.
- BILATERALLY SYMMETRICAL, TRIPLOBLASTIC, COELOMIC AND SEGMENTED WITH COMPLEX DIFFERENTIATION OF BODY TISSUES AND ORGANS

THE FEATURES OF CHORDATES

I. HAVE A NOTOCHORD
II. HAVE A DORSAL NERVE CORD
III. ARE TRIPLOBLASTIC
IV. HAVE PAIRED GILL POUCHES
V. ARE COELOMATE

TYPES OF VERTEBRATA

1) CYCLOSTOMATA
2) PISCES
3) AMPHIBIA
4) REPTILIA
5) AVES
6) MAMMALIA

X.I. CYLOSTOMATA

- JAWLESS VERTEBRATES
- HAVING AN ELONGATED EEL-LIKE BODY, CIRCULAR MOUTH, SLIMY SKIN AND ARE SCALELESS.
- THEY ARE ECTOPARASITES OR BORES OF THE OTHER VERTEBRATES.
- Eg. LAMPRAY AND HAGFISH

X.II. PISCES

- THESE ARE FISH
- EXCLUSIVELY AQUATIC ANIMALS
- SKIN IS COVERED WITH SCALES OR PLATES
- OBTAIN OXYGEN DISSOLVED IN THEWATERBY USING GILLS
- BODY IS STREAMLINED, AND A MUSCULAR TAIL IS USED FOR MOVEMENT
- **COLD BLOODED TWO CHAMBER HEART**
- THEY LAY EGGS
- Eg. SHARKS, TUNA OR ROHU, SCOLIODON(DOG FISH) ELECTRIC RAY(TORPIDO), LION FISH

X.III. AMPHIBIA

- DIFFER FROM FISH IN THE LACK OF SCALES, IN HAVING MUCUS GLANDS IN THE SKIN, AND A 3 CHEMBERED HEART
- RESPIRATION IS THROUGHEITHER GILLS OR LUNGS
- LAY EGGS
- FOUND BOTH IN WATER AND ON LAND
- Eg. FROGS, TOADS AND SALAMANDERS
- HYLA(TREE FROG), RANA TIGRINA(COMMON FROG)

X.IV. REPTILIA

- COLD BLOODED
- HAVE SCALES AND BREATHE THROUGH LUNGS
- 3 CHAMBERED HEART, CROCODILE HAVE FOUR CHAMBERED HEART
- LAY EGGS WITH TOUGH COVERING AND DO NOT NEED TO LAY THEIR EGGS IN WATER, UNLIKE AMPHIBIANS
- Eg. SNAKES, TURTLES, LIZARDS AND CROCODILES

X.V. AVES

- WARM BLOODED
- 4 CHAMBERED HEART
- LAY EGGS
- THERE IS AN OUTSIDE COVERING OF FEATHERS, AND TWO FORELIMBS ARE MODIFIED FOR FIGHT.
- THEY BREATHE THROUGH LUNGS
- Eg. ALL BIRDS

X.VI. MAMMALIA

- WARM-BLOODED ANIMALS
- 4 CHAMBERED HEARTS
- HAVE MAMMARY GLANDS FOR THE PRODUCTION OF THE MILK TO NOURISH THEIR YOUNG
- THEIR SKIN HAS HAIRS AS WELL AS SWEAT AND OIL GLANDS
- PLATYPUS AND ECHIDNA ONLY MAMMALS LAY EGGS
- Eg. HUMAN, CAT, WHALE, RAT AND BAT